#14/Appeal Brief
7/8/03
C. Moore

ATTORNEY DOCKET NO.: GEVA 6-2-4-21 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Michael Geva, *et al.*

Serial No.: 09/757,099

Filed: January 8, 2001

For: ELECTRONIC DEVICE HAVING A BARRIER REGION INCLUDING ALUMINUM AND A METHOD OF MANUFACTURE THEREFOR

Group No.: 2882

Examiner: Wang, George Y.

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF FIRST CLASS MAILING

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Sirs:

APPELLANTS' BRIEF UNDER 37 C.F.R. §1.192

This is an appeal from a Final Rejection dated November 29, 2002, of Claims 1-16. The Appellants submit this Brief in triplicate as required by 37 C.F.R. §1.192(a), with the statutory fee of $320.00 as set forth in 37 C.F.R.§1.17(c), and hereby authorize the Commissioner to charge any

additional fees connected with this communication or credit any overpayment to Deposit Account No. 08-2395.

This Brief contains these items under the following headings, and in the order set forth below in accordance with 37 C.F.R. §1.192(c):

I. REAL PARTY IN INTEREST

II. RELATED APPEALS AND INTERFERENCES

III. STATUS OF CLAIMS

IV. STATUS OF AMENDMENTS

V. SUMMARY OF INVENTION

VI. ISSUES

VII. GROUPING OF CLAIMS

VIII. SUMMARY OF THE REFERENCE RELIED ON BY THE EXAMINER

IX. APPELLANTS' ARGUMENTS

X. APPENDIX A - CLAIMS

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is the Assignee, TriQuint Technology Holding Co.

II. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences will directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

The Applicants originally submitted Claims 1-20 in the application. Pursuant to a restriction requirement, the Applicants elected, with traverse, Claims 1-16, comprising Group II. Subsequent to the election, the Applicants canceled Claims 17-20 without prejudice or disclaimer in response to the restriction requirement, and have neither canceled, amended nor added any other claims. Therefore, Claims 1-16 are pending and currently stand rejected with no claims objected to or allowed. Claims 1-16 are being appealed.

IV. STATUS OF THE AMENDMENTS

On October 25, 2002, the Appellants filed an amendment canceling Claims 17-20 without prejudice or disclaimer. By an office action dated November 29, 2002, the Examiner notified the Appellants that the amendment had been received and entered, and issued a final rejection. After a response by the Appellants, the Examiner issued an advisory action dated February 26, 2003. On March 31, 2003, the Appellants filed a Notice of Appeal.

V. SUMMARY OF THE INVENTION

Among other things, the present invention provides an electronic device having a barrier region including aluminum located over an undoped layer. As shown in the Illustration 1 below, which is FIGURE 1 in the present application, the electronic device 100 includes an active region 130 located over a substrate 110. Located over the active region is an undoped layer 140, such as an indium phosphide undoped layer. Located over the undoped layer 140 is a barrier region 150. In accordance with the principles of the present invention, the barrier region 150 must include aluminum. As is further shown in Illustration 1, a doped upper cladding layer 170 is located over the barrier region 150.

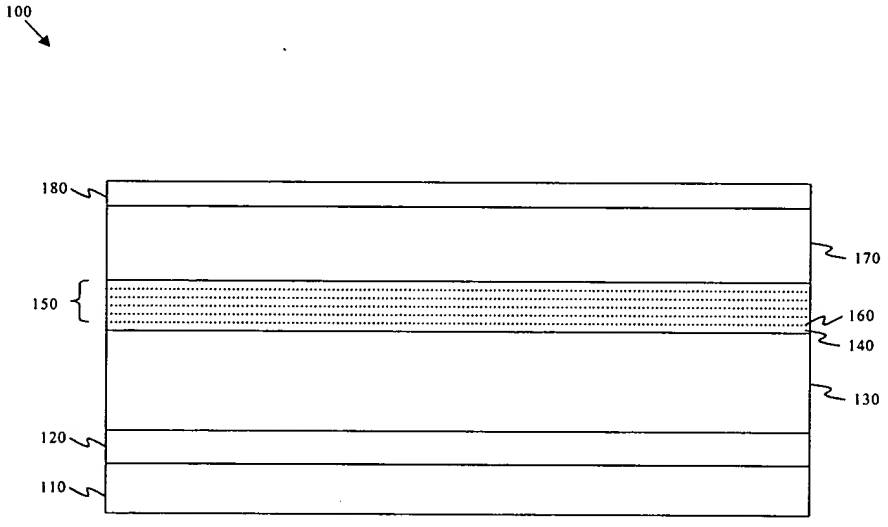


FIGURE 1

Illustration 1

VI. ISSUES

Whether Claims 1-16 are unpatentable under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 4,546,480 to Burnham, *et al.* (Burnham) in view of the foreign Patent No. WO 97/50133 to DePoorter (DePoorter).

VII. GROUPING OF THE CLAIMS

Claims 1-16 stand or fall together.

VIII. SUMMARY OF THE REFERENCE RELIED ON BY THE EXAMINER

A. Burnham

Burnham teaches an injection laser having quantum size effect transparent waveguiding. (Title) With reference to Illustration 2 (FIG.s 2 & 4 of Burnham) Burnham discloses that the laser includes an active layer 36 located on a lower cladding layer 34, wherein the active layer 36 has an upper cladding layer 41 formed directly thereon. (See FIG. 2 and column 4, lines 20-60). Burnham teaches that the active layer 36 may include an active region 38. In an alternative embodiment, Burnham teaches that the active layer 36 may comprise multiple quantum well passive regions 36.1. (Column 5, lines 45-48). Burnham further teaches that the device of FIG. 4 is identical to that of FIG. 2, except that the active layer 36 of FIG. 4 comprises the aforementioned quantum well passive regions. Burnham also teaches that an implantation step forms current confinement regions 46 in a content layer 40 located on the upper cladding layer 41.

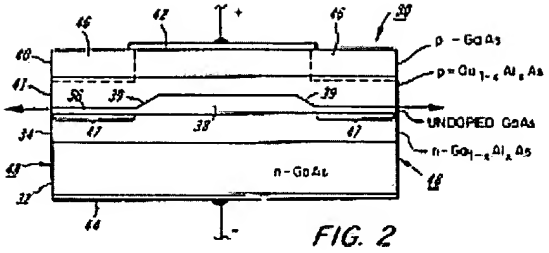


FIG. 2

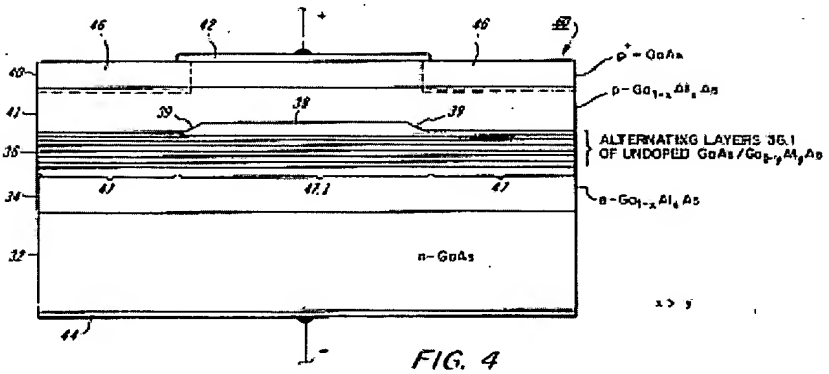


FIG. 4

Illustration 2

B. DePoorter

DePoorter is directed to a radiation-emitting semiconductor diode, and method of manufacture therefore. (Title) With reference to Illustration 3 (FIG. 1of DePoorter) DePoorter teaches a substrate 1 on which is situated a first cladding layer 2. DePoorter teaches that located on the first cladding layer 2 is an active layer 3, and that located on the active layer 3 is a second cladding layer 4. DePoorter further teaches that a barrier layer 9 may be located on the active layer 3 and under the second cladding layer 4.

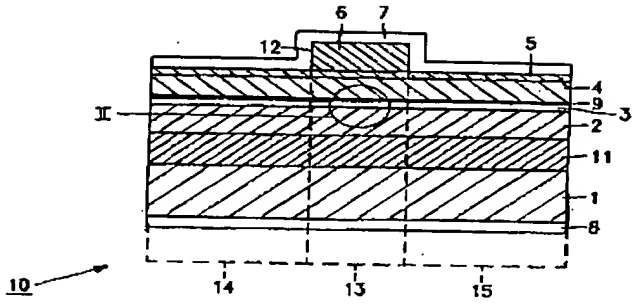


FIG. 1

Illustration 3

IX. THE APPELLANTS' ARGUMENTS

The Appellants respectfully disagree with the Examiner's conclusion that the claimed inventions are obvious over Burnham in view of DePoorter. The Examiner relies chiefly on Burnham for teaching or suggesting the features presently recited in the claimed inventions and relies on DePoorter for the sole teaching that its upper cladding layer may be doped with zinc. Initially, the Appellants wish to point out that the combination of Burnham and DePoorter does not teach or suggest an undoped layer located over the active region, wherein the undoped layer has a barrier region including aluminum located thereover, and an upper cladding layer located over the barrier region. To the contrary, the combination teaches or suggests a multi quantum well region including aluminum located over a lower cladding layer, an active region located over the multi quantum well region and a zinc doped upper cladding layer located on the active region. Thus, the combined teachings differ significantly from the present invention, namely because the multi quantum well region is not a barrier region, and further that the so called barrier region (i.e., Burnham's multi quantum well region) is located under the active region.

The Appellants' invention recites an active region located over a substrate, wherein the active region has an undoped layer located thereover. The Appellants' invention further recites that a barrier region including aluminum is located over the undoped layer, and that a doped upper cladding layer is located over the barrier layer. Therefore, the present invention requires that the barrier region be located between the undoped layer and the doped upper cladding layer, and over the active region. According to the present invention, the precise placement of the various layers is quite important. Contrast this with the combined teachings or suggestions in Burnham and DePoorter where the so called barrier region (i.e., Burnham's multi quantum well region) is located under the active region, and not between the undoped layer and the doped upper cladding layer at all. First, the multi quantum well region of Burnham is not a barrier region at all, but a passive waveguide for coupling the energy created in the active region to an attached optical fiber. Second, the so called barrier region (i.e., Burnham's multi quantum well region) is located under the active region, and not between the undoped layer and the doped upper cladding layer, as required by the independent claims of the present invention.

The Examiner asserts that one skilled in the art would be motivated by the teachings of Burnham to move its multi quantum well region from its described location below the active region to above the active region, thereby making the present invention obvious. First, the Examiner is still incorrectly reciting that the multi quantum well region of Burnham is actually a barrier region including aluminum. Just because the multi quantum well region includes aluminum, does not mean that it is a barrier region. Second, one skilled in the art would not be motivated at all to move the multi quantum well region of Burnham above its active region, as to do so would prevent the device from operating properly. Namely, if the multi quantum well region of Burnham were moved above

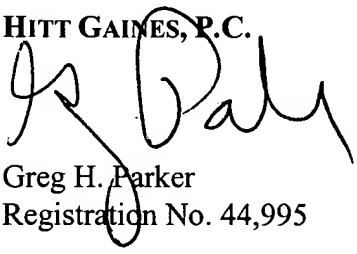
the active region as the Examiner states is obvious, the multi quantum well region would absorb at least a part, if not a substantial part, of the carriers before they reached the active region. This would prevent, or substantially prevent, the active region from performing its intended purpose, that of producing photons. For this reason, one skilled in the art would not be motivated, and would actually be strongly against moving the multi quantum well region of Burnham above its active region as the Examiner states is obvious.

In conclusion, the combination of Burnham and DePoorter, fails to teach or suggest the invention recited in independent Claims 1 and 9, and therefore, the combination fails to establish a *prima facie* case of obviousness with respect to the claimed invention.

Because Claims 2-8 and 10-16 are dependent upon independent Claims 1 and 9, the combination also fails to establish a *prima facie* case of obviousness with respect to these claims. Accordingly, the Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the Examiner's Final Rejection of the Appellants' pending claims.

Respectfully submitted,

HITT GAINES, P.C.



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X. APPENDIX A - CLAIMS

1. An electronic device, comprising:

an active region located over a substrate;

an undoped layer located over the active region, the undoped layer having a barrier region including aluminum located thereover; and

a doped upper cladding layer located over the barrier region.

2. The electronic device as recited in Claim 1 wherein the barrier region is a barrier layer or a number of barrier layers located between a plurality of the undoped layers.

3. The electronic device as recited in Claim 2 wherein the number of barrier layers ranges from about 1 to about 8 layers and each of the number of barrier layers has a thickness of about 1 nm.

4. The electronic device as recited in Claim 1 wherein the barrier region includes an barrier layer consisting of aluminum arsenide, aluminum phosphide, indium aluminum arsenide, indium aluminum arsenide phosphide, or indium aluminum gallium arsenide.

5. The electronic device as recited in Claim 4 wherein the barrier layer comprises between about 5 and about 50 percent aluminum.

6. The electronic device as recited in Claim 1 wherein the barrier region has a thickness of about 1 nm and the undoped layer has a thickness of about 10 nm.

7. The electronic device as recited in Claim 1 wherein the barrier region does not form a p-n junction with the doped upper cladding layer.

8. The electronic device as recited in Claim 1 wherein the doped upper cladding layer is doped with zinc and the barrier region inhibits the diffusion of zinc into the active region.

9. A method of manufacturing an electronic device, including:

forming an active region over a substrate;

forming an undoped layer over the active region, the undoped layer having a barrier region including aluminum formed thereover; and

forming a doped upper cladding layer over the barrier region.

10. The method as recited in Claim 9 wherein the barrier region is a barrier layer or a number of barrier layers located between a plurality of the undoped layers.

11. The method as recited in Claim 10 wherein the number of barrier layers ranges from about 1 to about 8 layers and each of the number of barrier layers has a thickness of about 1 nm.

12. The method as recited in Claim 9 wherein the barrier region includes an aluminum barrier layer consisting of aluminum arsenide, aluminum phosphide, indium aluminum arsenide, indium aluminum arsenide phosphide, or indium aluminum gallium arsenide.

13. The method as recited in Claim 12 wherein the barrier layer comprises between about 5 and about 50 percent aluminum.

14. The method as recited in Claim 9 wherein the barrier region has a thickness of about 1 nm and the undoped layer has a thickness of about 10 nm.

15. The method as recited in Claim 9 wherein the barrier region does not form a p-n junction with the doped upper cladding layer.

16. The method as recited in Claim 9 wherein forming a doped upper cladding layer includes forming a zinc doped upper cladding layer, wherein the barrier region inhibits the diffusion of zinc from the upper cladding layer into the active region.